Appendix B

West Fork Smith River
Watershed Restoration Plan - 1998

West Fork Smith River Riparian/Instream Restoration Plan
1998

Introduction:

In 1996, a watershed analysis was completed for the West Fork of Smith River. At that time, no site specific watershed restoration plans were produced. Since then, a restoration team was convened to generate a detailed implementation plan. The core group consisted of several fisheries and wildlife biologists, a hydrologist, a forester and a silviculturist. Supporting team members consisted of a botanist and ecologist. The primary projects focus was on instream habitat development, riparian restoration. The projects identified in this plan may take several years to complete depending on the availability of funding.

Objectives:

Riparian Restoration-

- ✯ To restore habitat complexity to management-influenced riparian areas.

Instream Habitat Development-

- ✯ To restore the instream habitat components necessary for the survival and reproduction of native aquatic species in stream reaches degraded by past management practices.

<u>Project Summary Tables</u>:

Riparian Restoration

Riparian Unit #	# of alder to "cut and take"	# of alder to "cut and leave"	# of alder to girdle	# of alder to fall into stream
1	Unit Dropped			
2	75	133	26	33
3*	69	82	23	0
4	52	4	0	0
5	60	96	25	10
6	130	340	6	10
7	0	43	0	0
8	0	32	13	0
Total	386	730	93	53

*= an additional 3.5 acres of alder conversion will occur on the upslope side of the road in association with this unit

Instream Restoration

Instream Site #	# of trees to drop into channel		# of boulder clusters (estimate)	# of rootwads (estimate)	# of new weirs	Total boulder needs (cu.yds.)
	Alder	Conifer				
1	11	1	65	70	0	280
2	14	12*	105	35	0	420
3	14	0	85	50	0	420
4	86	0	0	0	0	0
5*	6	28	65	50	3	400
6	20	0	0	0	0	0
7	36	0	21	42	0	225
8	83	0	28	53	0	32
9	69	7	43	66	3	85
10	242	27	0	0	0	0
Totals	581	75	412	366	6	1862

*= trees have not been painted yet- these are estimates

Riparian Restoration Opportunities (details):

T20S/ R09W/ Sec.15/ SW- mainstem W.F.Smith River- ***Riparian Unit #1***

There are opportunities for *riparian release and/or conversion* projects at this site. Several areas within the site were marked for alder girdling or "cut and leave" to minimize disturbance to existing soils and down wood. The remaining alder would be candidates for removal. There is a patch in the middle of the area that could be converted to conifer (appx. 1 acre). The following is an approximate site summary: This site has been dropped

cut and take- 105 *cut and leave*- *girdle*-25

Alder are marked in blue paint ("O" for cut and take, "/" or "_" for cut and leave, "||" for girdle, and "~" for cut and fall into stream). The majority of alder were marked for leave to minimize disturbances to existing down wood and damage to residual trees. Those marked for take generally occur adjacent to roads.

T20S/ R09W/ Sec.10 (SE, NW) and Sec.15 (NE)- Crane Creek- ***Riparian Unit #2***

There are opportunities for *riparian release* projects at this site. The majority of trees identified were marked for alder girdling or cut and leave because they occur behind a major landslide which blocks the road (there is no access for removal). The remaining sites would allow for alder removal. The following is a site summary:

cut and take- 75 *cut and leave*- 133 *girdle*-26 *stream*- 33

Alder are marked in blue paint ("O" for cut and take, "/" or "_" for cut and leave, "||" for girdle, and "~" for cut and fall into stream). The majority of alder were marked for leave to minimize disturbances to existing down wood and damage to residual trees. Those marked for take generally occur adjacent to roads.

T20S/R09W/Sec.10/ SE/ SE- Mainstem W.F.Smith River near Moore Crk.- ***Riparian Unit #3***

There are opportunities to *release* approximately 30 conifers in the area between the West Fork road and the river.

cut and take-69 *cut and leave*-82 *girdle-23*

Approximately 3.5 acres of alder stands will be converted above the road and conifer will be established (planted).

Alder are marked in blue paint ("O" for cut and take, "/" or "_" for cut and leave, "||" for girdle, and "~" for cut and fall into stream). The majority of alder were marked for leave to minimize disturbances to existing down wood and damage to residual trees. Those marked for take generally occur adjacent to roads.

T20S/R09W/Sec.11/ West Half- Moore Creek- ***Riparian Unit #4***

There are approximately 140 conifers that could be *released* along Moore Creek road. Potential removal of the alder through small sales depends on whether or not the falling activity is completed before road closure activities occur (summer 1998)-

cut and take-52 *cut and leave*-54

Alder are marked in blue paint ("O" for cut and take, "/" or "_" for cut and leave, "||" for girdle, and "~" for cut and fall into stream). The majority of alder were marked for leave to minimize disturbances to existing down wood and damage to residual trees. Those marked for take generally occur adjacent to roads.

T20S/R09W/Sec.12/ NW/ NE- Mainstem W.F.Smith River- ***Riparian Unit #5***

There are opportunities to *release* many conifers in this unit. The following have been marked with blue paint and occur above the road:

cut and take- 32 *cut and leave*- 12 *girdle*-10

The folllowing have been marked with blue paint and occur between the road and the river

cut and take- 28 *cut and leave*- 84 *girdle*- 15 *fall into stream*- 10

Alder are marked in blue paint ("O" for cut and take, "/" or "_" for cut and leave, "||" for girdle, and "~" for cut and fall into stream). The majority of alder were marked for leave to minimize disturbances to existing down wood and damage to residual trees. Those marked for take generally occur adjacent to roads.

T20S/R09W/Sec.12/ NW/ NW- Mainstem W.F.Smith River- ***Riparian Unit #6***

There are opportunities to *release* large amounts of conifer in this area. The following have been marked with blue paint:

cut and take-130 *cut and leave*- 340 *girdle*- 6 *fall into stream*- 10

Alder are marked in blue paint ("O" for cut and take, "/" or "_" for cut and leave, "||" for girdle, and "~" for cut and fall into stream). The majority of alder were marked for leave to minimize disturbances to existing down wood and damage to residual trees. Those marked for take generally occur adjacent to roads.

T20S/R09W/Sec.1/ SW/ SW- Mainstem W.F.Smith River- ***Riparian Unit #7***

There are opportunities to *release* existing conifer in this area. The following have been marked with blue paint:

cut and leave- 43 (most of the trees to fall do not occur on the road-side of the stream)

Alder are marked in blue paint ("/" or "_" for cut and leave)

T20S/R09W/Sec.1/ SW/ SW- Mainstem W.F.Smith River- ***Riparian Unit #8***

There are opportunities to *release* existing conifer in this area. The following have been marked with blue paint:

cut and leave- 32 *girdle*-13

Alder are marked in blue paint ("/" or "_" for cut and leave and "||" for girdle)

Instream Restoration Opportunities (details):

Several opportunities exist on the mainstem and it's tributaries for the addition of complexity to the instream areas. Most projects would include the falling of alder into the stream, the placement of boulders to anchor them, the addition of boulder clusters with and without rootwads attached, and the addition of boulder weirs. The objective is to try and break up the flow patterns of the stream to reduce overall velocities which would encourage substrate deposition. The structures may also help to retain downstream moving organic debris (wood and others) which would provide nutrient inputs and a variety of habitats for aquatic organisms. The following are summaries of initial project layout designs. The information should assist in assessing the costs of implementing the projects.

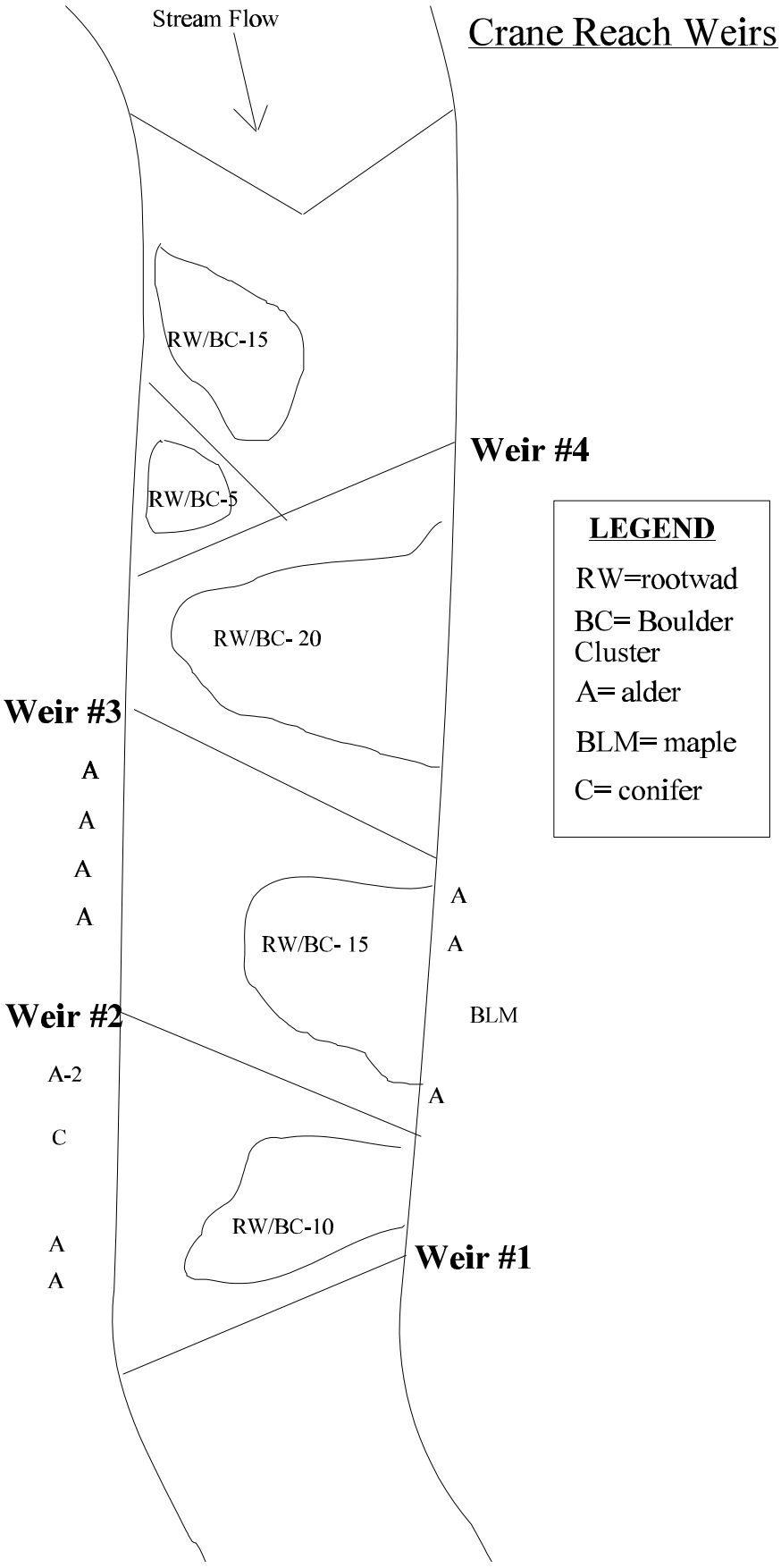
Instream Site #1

The primary objective at this site is to add complexity to currently existing weirs through the addition of boulder clusters with rootwads and a few fallen trees from the riparian area.

Crane Reach Weirs (on mainstem W.F.Smith)- T20/R09/Sec.15/ SE/NW- Drawing #1

Weir Number	# of alder to drop	# of boulder clusters	# of rootwads needed	Volume of boulders needed (cu. yrds.)
1	4 - left bank 1 conifer - left bank	10	10	50
2	3 - right bank 1 maple- right bank 4- left bank	15	15	80
3	none	20	30	80
4	none	20	15	70
5	none	none	none	none
Total	13	65	70	280

Crane Reach Weirs

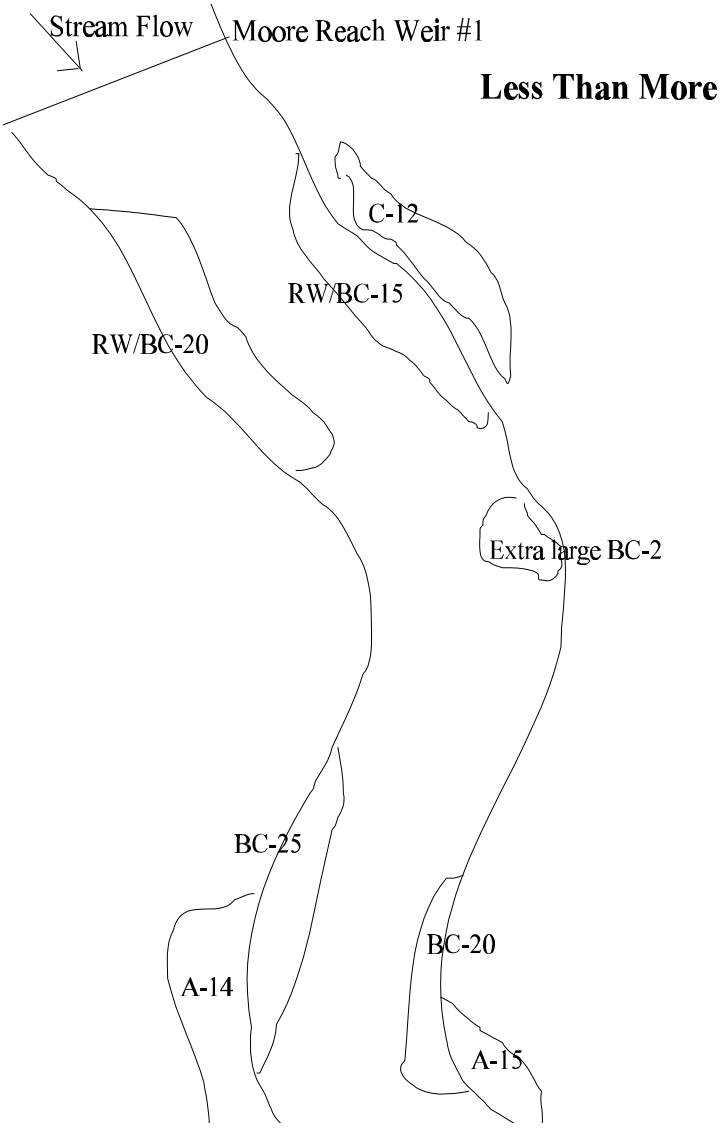


Instream Site #2

The primary objective at this site is to add complexity to the stream channel through the addition of boulder clusters with rootwads and fallen trees from the riparian area.

Less Than Moore- T20/R09/Sec.10/SE/SE

Location	# of alder to drop	# of boulder clusters	# of rootwads needed	Volume of boulders needed (cu. yds.)
left bank at curve	14	25	none	120
right bank at curve	15	20	none	100
straight area below first weir				
-- left bank	none	20	20	100
-- right bank	12 conifer (tree line or cut)	17	15	25 extra large 75 regular
Total	41	105	35	420



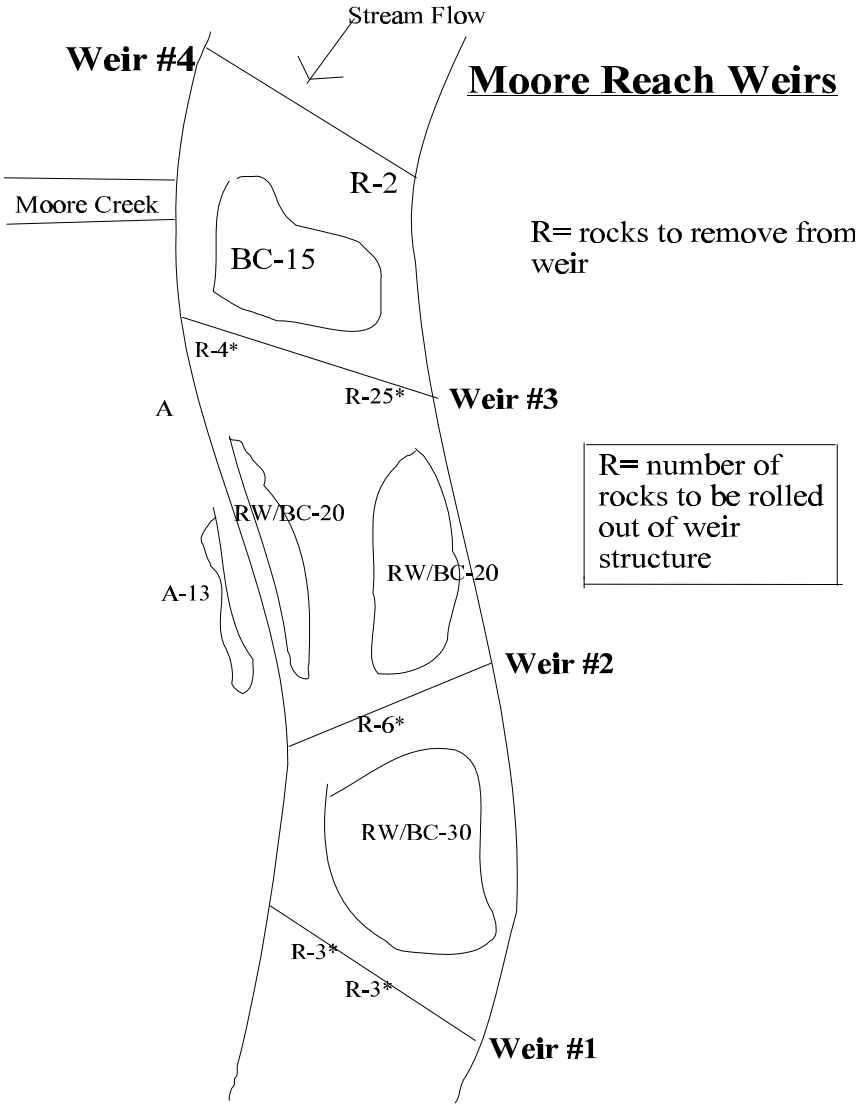
Instream Site #3

The primary objective at this site is to add complexity to currently existing weirs through the addition of boulder clusters with rootwads and a few fallen trees from the riparian area.

Moore Reach Weirs (on mainstem W.F.Smith)- T20/R09/Sec.11/SW/SW

Weir Number	# of alder to drop	# of boulder clusters	# of rootwads needed	Volume of boulders needed (cu. yds.)
1*	none	30	20	160
2*	14- left bank	40	30	200
3*	none	15	none	60
4*	none	none	none	none
Totals	14	85	50	420

*- denotes the need for creating small low gradient gaps in each of the existing weirs by removing several of the existing top rocks (not the entire depth of the weir)- rocks will be placed below each of the weirs (see file drawing below for locations and numbers)


Stream Flow
Weir #4
Moore Reach Weirs
R-2
Moore Creek
BC-15
R= rocks to remove from weir
R-4*
R-25*
Weir #3
A
R= number of rocks to be rolled out of weir structure
RW/BC-20
RW/BC-20
A-13
Weir #2
R-6*
RW/BC-30
R-3*
R-3*
Weir #1

Instream Site #4

Moore Creek Proper- T20/R09/Sec.11/ NW and SW

In order to increase structural diversity within the stream channel, a total of 86 alder were painted in blue for falling into the creek. Total treated area is approximately 0.3 miles and begins above culvert at W.F.Smith R. Road junction.

Instream Site #5

The primary objective at this site is to add complexity to the channel through the addition of new weirs near the upper portion of the site and through the addition of boulder clusters with rootwads and a few fallen trees from the riparian area to the entire area.

Big Bend - T20/R09/Sec.11/ SE and Sec.14/NE

New Weir Sites Ref. Number	# trees to drop	# of boulder clusters needed	# of rootwads needed	Volume of boulder needed for new weirs	Volume of boulders needed (cu.yds.)
1*	2 (conif.)	50	40	70	200
2*	2 (conif.)-climb 1 for MAMU	5	5	70	100
3*	2 (conif.)	10	5	70	100
Totals	6	65	50	210	400

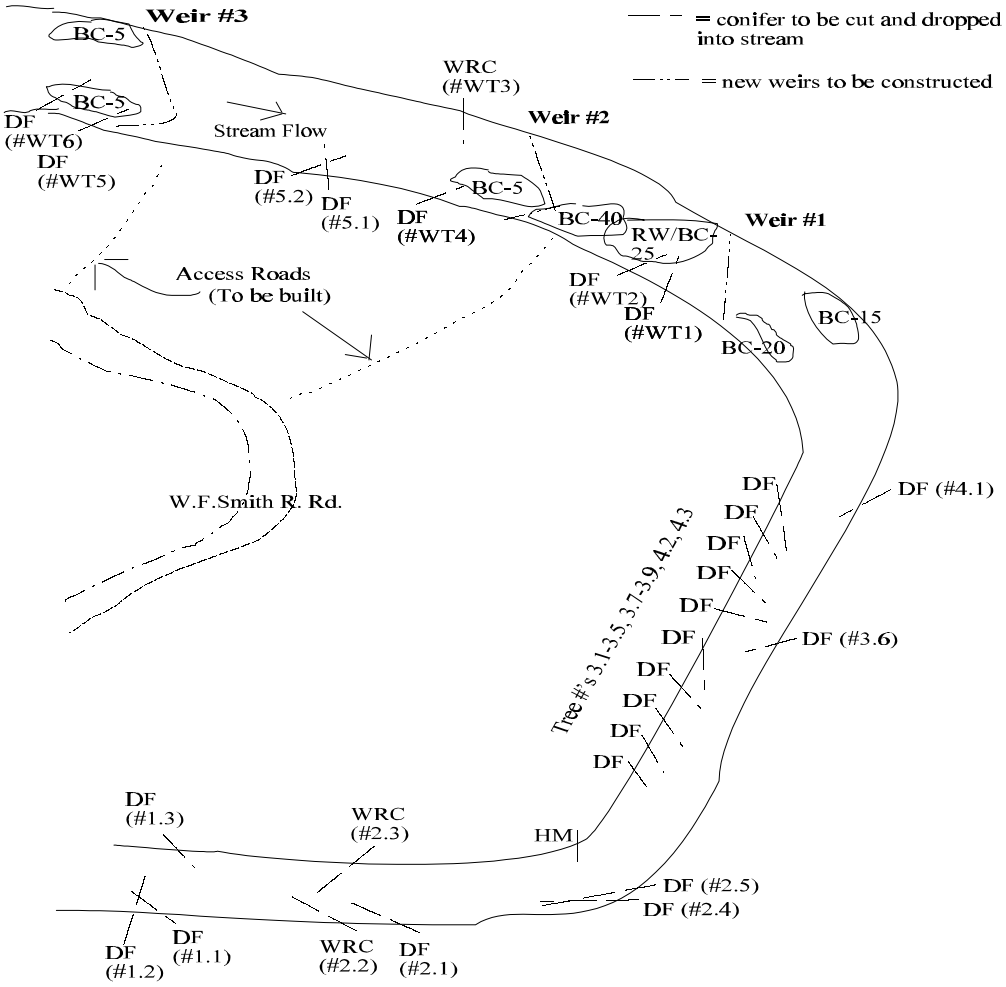
*= new weirs require approximately 70 yards of boulder each

note: this site will require the construction of 2 access roads to the creek- they have already been flagged on the ground (in pink) and are shown on the site diagram

Tree falling sites at Big Bend:

Site Number	# of conifers to fall	# of alder to fall	# of Trees to climb (MAMU)	Tree size range (dbh)
1	3	4	2	30"-38"
2	6	1	3	28"-38"
3	9	0	1	20"-35"
4	3	0	2	26"-42"
5	2	0	2	24"-38"
Totals	23	5	10	20"-42"

Big Bend


Weir #3
BC-5
BC-5
DF
(#WT6)
DF
(#WT5)
WRC
(#WT3)
Weir #2
Stream Flow
DF
(#5.2)
DF
(#5.1)
DF
(#WT4)
BC-5
BC-40
RW/BC-25
Weir #1
Access Roads
(To be built)
DF
(#WT2)
DF
(#WT1)
BC-20
BC-15
W.F.Smith R. Rd.
DF
DF
DF
DF
DF
DF
DF
DF
DF
DF
DF
DF (#4.1)
DF (#3.6)
Tree #'s 3.1-3.5, 3.7-3.9, 4.2, 4.3
DF
(#1.3)
WRC
(#2.3)
HM
DF (#2.5)
DF (#2.4)
DF
(#1.2)
DF
(#1.1)
WRC
(#2.2)
DF
(#2.1)
= conifer to be cut and dropped into stream
= new weirs to be constructed

Big Bend (continued):
List of trees to fall, their associated species, size and which to climb for Marbled Murrelets :

Tree #	Species/ Size	MAMU climb	Tree #	Species/ Size	MAMU climb	Tree #	Species/ Size	MAMU climb
1.1	DF-38	--	**3.2**	DF-20	--	**4.3**	DF-38	--
1.2	DF-36	--	**3.3**	DF-26	--	**5.1**	DF-24	1
1.3	DF-30	2	**3.4**	DF-35	--	**5.2**	DF-38	--
2.1	DF-30	--	**3.5**	DF-25	--	**WT1**	DF-32	--
2.2	WRC-28	--	**3.6**	DF-30	1	**WT2**	DF-24	--
2.3	WRC-32	--	**3.7**	DF-31	--	**WT3**	DF-35	--
2.4	DF-28	--	**3.8**	DF-24	--	**WT4**	WRC-50	1
2.5	DF-38	3	**3.9**	DF-21	--	**WT5**	DF-32	--
2.6	HM-8	--	**4.1**	DF-42	2	**WT6**	DF-35	--
3.1	DF-27	--	**4.2**	DF-26	–			

Instream Site #6

Beaver Creek Proper-

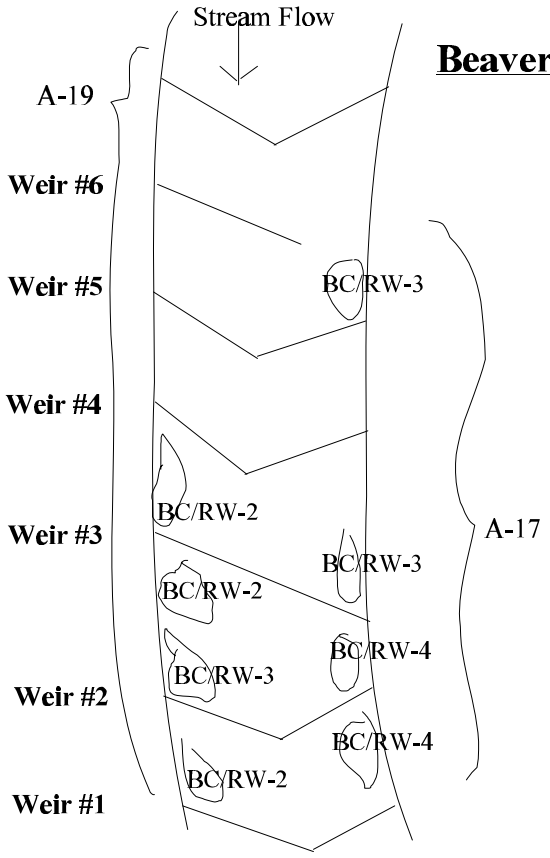
The primary objective of project is to increase in-channel diversity through the addition of approximately 20 alder (painted in blue) into the lower portions of the creek (up to about mile 0.2). There is one potential site where a large conifer could be topped to create snag habitat while having the top fall into the creek for instream habitat. Tree requires further wildlife review. T20/R09/Sec.1/SW/SW and Sec.2/SE/NE

Instream Site #7

The primary objective at this site is to add complexity to currently existing weirs through the addition of boulder clusters with rootwads and a few fallen trees from the riparian area.

Beaver Reach Weirs- T20/R09/Sec.1/SW/SW

Weir Number	# of alder to drop	# of boulder clusters	# of rootwads needed	Volume of boulders needed (cu. yrds.)
1	17 along the right bank 19 along the left bank	6	12	95
2		7	14	85
3		5	10	30
4		0	0	0
5		3	6	15
6		0	0	0
7		0	0	0
Total	36	21	42	225



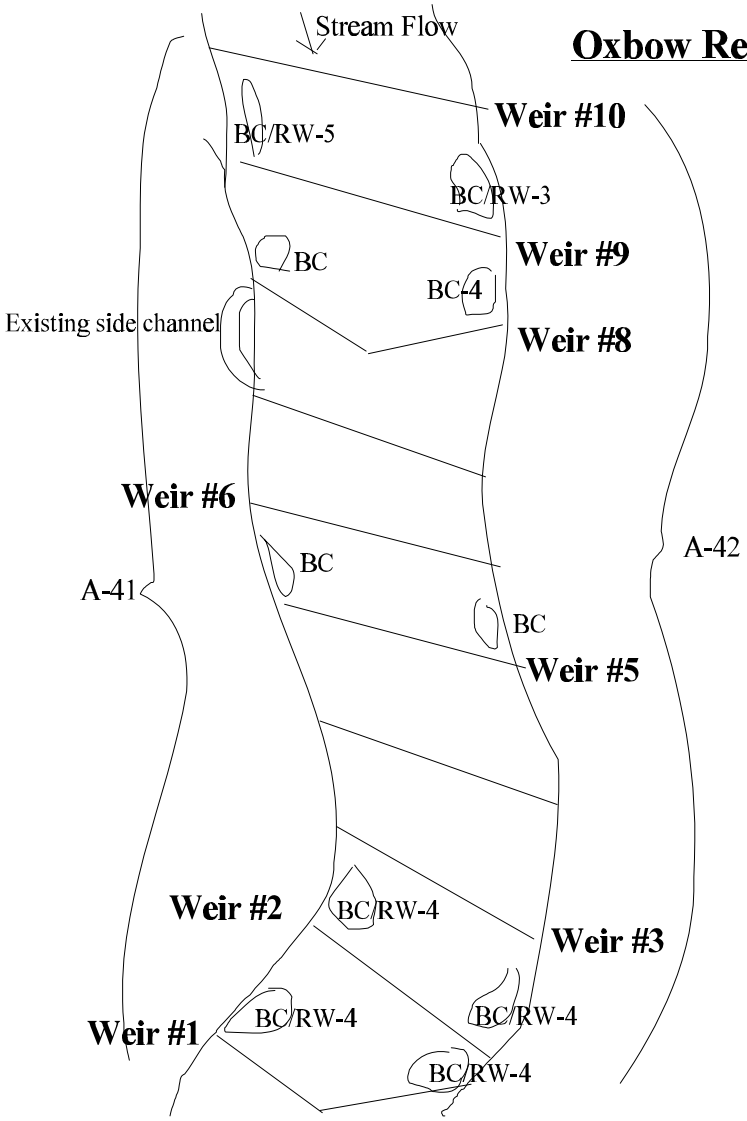
Instream Site #8

The primary objective at this site is to add complexity to currently existing weirs through the addition of boulder clusters with rootwads and a few fallen trees from the riparian area.

Oxbow Reach Weirs- T20/R09/Sec.1/SE/NW

Weir Number	# of alder to drop	# of boulder clusters	# of rootwads needed	Volume of boulders needed (cu. yds.)
1	41 along the left bank 42 along the right bank	8	15	80
2		8	15	80
3		none	none	none
4		none	none	none
5		none	none	20
6		none	none	none
7		none	none	none
8		4	8	40
9		8	15	100
10		none	none	none
11		none	none	none
Total	83	28	53	32

Oxbow Reach Weirs



Instream Site #9

The primary objective at this site is to add complexity to the channel through the addition of new weirs near the upper portion of the site and through the addition of fallen trees from the riparian area to the entire area.

Three weirmigos- T20/R09/Sec.1/SE/NE

Site Number	# of new weirs	# of alder to drop	# of boulder clusters	# of rootwads needed	Volume of boulders needed for new weirs	Total volume of boulders needed
1	none	43 alder/ 3 conifer along left bank 26 alder/ 3 conifer along right bank	none	none	none	10
2	none		8	16	none	40
3	none		20	30	none	70
4	none		5	none	50	75
5	none		5	10	50	125
6	none		5	10	50	125
Total	0	76	43	66	150	445

note: this site may require construction of a new access road

Instream Site #10

T19S/R08W/Sec.31/west half- Lotsatrees

The opportunity to drop alder and conifer trees into the stream channel is exceptional here. The current instream habitat is dominated by a lack of pools and instream structure. There is also very little opportunity for machine access. The proposal for this section is to drop 268 trees (26 conifer, remainder in alder) into the channel to allow the stream to carry the trees downstream. It is likely that the trees will jam up in spots creating short term habitat. . The diameters of the trees range between 6" and 24"dbh.

Cost Estimates

Estimated costs to complete projects using contractors [note: using district road maintenance crews could cost one-third to one-half as much]. These estimates may be low.

Instream Projects:

Crane Reach Weirs (Site #1)	$ 15,000
Less Than Moore (Site #2)	$ 20,000
Moore Reach Weirs (Site #3)	$ 20,000
Moore Creek Proper (Site #4)	$ 3,000
Big Bend Reach (Site #5)	$ 25,000
Beaver Creek Proper (Site #6)	$ 1,000
Beaver Reach Weirs (Site #7)	$ 10,000
Oxbow Reach Weirs (Site #8)	$ 10,000
Three Weirmigos (Site #9)	$ 20,000
Lotsatrees (Site #10)	$ 10,000
	$134,000

Riparian Projects:

Cost will vary depending on how many trees will be sold under small sales and how many will be dropped and left on site (contracted out).

All sites excluding small sales portions	$ 20,000